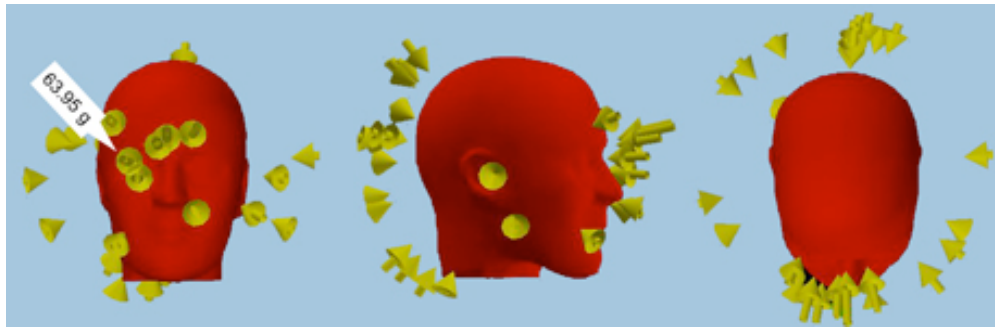


Does the force of a hit directly correlate to severity of injury?

Monitors in a helmet of a 20-year-old college football defensive end showed he sustained 31 head impacts over 2 practice sessions. During the morning practice, two impacts were sustained to the front of the head registering 79 g and 98 g. During the second practice session later that same day, he sustained two more head impacts to the front of the head. These measured 65 g and 64 g.



Source: Matthew Gfeller Sport-Related TBI Research Center, University of North Carolina at Chapel Hill

The athlete only reported symptoms to the athletic training staff after this last impact. He did not complain of any symptoms from the impacts sustained earlier in the day.

Teaching Points:

A concussion can occur from any type of external force to the head or body that causes the brain to accelerate and decelerate with translational, rotational, and/or angular forces. Brain injuries can result on the side of the force (coup) or on the side opposite the force (contrecoup).

Different biomechanics may result in varied symptoms of concussion. It is important to question the patient and document the type of force and location where the force was received. The magnitude of that force may dictate how much damage may be occurring inside the brain tissue. However, a relatively minor force can also lead to significant symptoms. In these cases, an athlete may have increased vulnerability to concussion, or may have other physical or psychological factors that are exacerbating symptoms.

Rotational force is also a factor. Studies show the magnitude of rotational force can cause a concussion and increase its severity. Among them, angular accelerations may increase the risk of concussion from 25% to 80%.

Key Takeaway:

- Some experts suggest that short-term cumulative sub-concussive head impacts may potentially reduce the threshold for potential injury.
- Many times a clinical concussion does not correlate with the magnitude of the hit or blow recorded by sensors.
- Measuring the magnitude, direction and location of a hit or blow to the head currently is a research process helping to expand knowledge about concussions.

This case study provides an overview of a select medical issue that is important to health care professionals who are responsible for athletes with concussion. It is not intended as a standard of care, and should not be interpreted as such. This case study is only a guide or teaching tool, and as such, is of a general nature, consistent with the reasonable, objective practice of the health care professional. Individual treatment will turn on the specific facts and circumstances presented to the health care professional.